

Saturday Magazine.

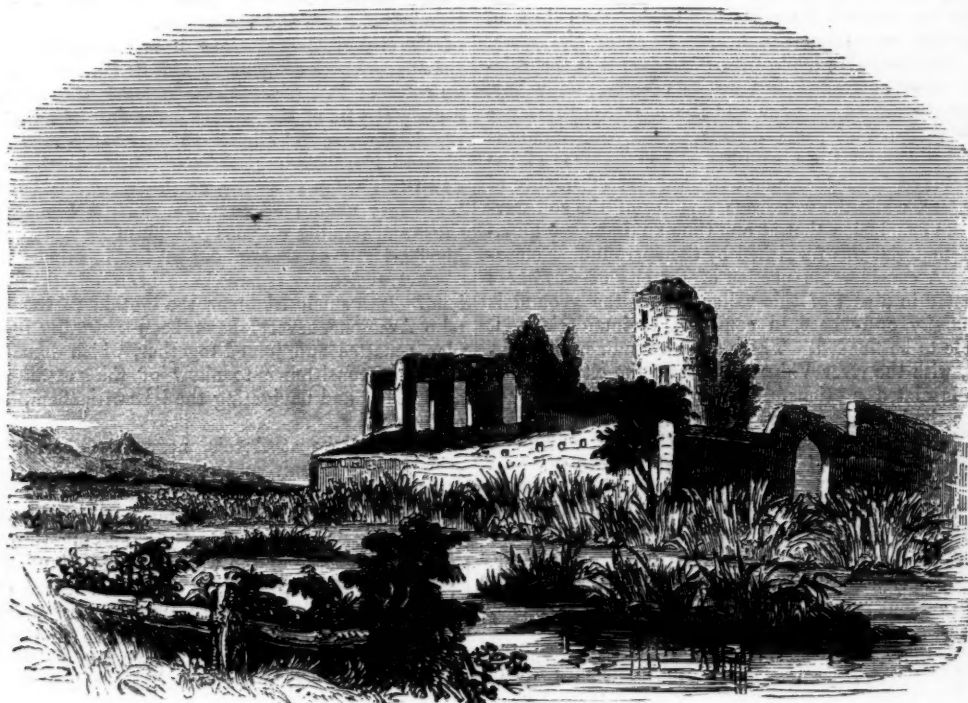
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FLOATING ISLANDS.



THE LAKE OF THE FLOATING ISLANDS.

It was a fancy of the ancient Greeks, that Delos, one of the Cyclades, in the Archipelago, was originally an island floating on the waves, and exposed to all the casualties of storm and tempest, but that Neptune, out of pity for its forlorn condition, made it stationary, and in order to fix it securely, begirt it with the two islands, Mycone and Gyaros. Absurd as this idea may appear to us, there are many instances of floating islands really existing at the present day, and it is only the size and situation of Delos, with the superstition respecting Neptune, that make the story of the Greeks incredible.

In various parts of the world these islands are formed, either naturally or artificially, on lakes and rivers; but perhaps the most celebrated among them are the *Chinampas*, or floating gardens of Mexico. It is said that they owe their origin to the extraordinary situation in which the Aztecs were placed on the conquest of their country by a neighbouring nation. They were driven to take refuge in small islands on the lake, and were obliged to exercise the utmost ingenuity in order to provide a sufficiency of food for their sustenance. Humboldt thinks that the idea of these gardens was suggested by Nature herself, since on the marshy banks of the lakes of Xochimilco and Chalco, the agitated waters, in the time of the great floods, carry away pieces of earth, covered with herbs, and bound together with roots. Whatever may have first prompted the idea, we find that the early *Chinampas* were generally composed of fragments of earth, artificially joined together and cultivated, and that their use was for some time confined to the growth of maize and other necessities of life. When the Mexicans had delivered themselves

from their unhappy condition, the floating gardens of their lakes were no longer appropriated to the exclusive cultivation of necessities, but became the means of adding to the luxuries of the people, and teemed with delicious fruits and fragrant flowers. These gardens are now extremely common in Mexico, and are of two kinds: those which are always floating about on the water, and are wafted hither and thither by the capricious winds; and those which are attached to the shore by chains, for the convenience of the proprietor, who perhaps has his dwelling on the adjacent bank. But even in this latter case, if the owner of the *Chinampa* becomes dissatisfied with his situation, or has some disagreeable neighbour whom he wishes to avoid, he has nothing to do but to unloose the chains which bind his island to the spot, and with his hut and his plantation, float wherever he pleases.

The principal supply of flowers and roots required in the city of Mexico is obtained from these gardens, nor is the cultivation of the useful vegetables neglected. Some of these fertile spots are devoted to the rearing of beans, artichokes, and cauliflowers, round which a hedge of rose-bushes gives solidity to the soil, and in the time of their blossoming, a lovely and fragrant ornament to the whole. In the driest seasons these *Chinampas* are always productive, and when it is necessary to renew the powers of the soil it is easily done by means of mud taken from the bottom of the lake, which is of a highly fertilizing quality. The gardens are sometimes of considerable extent, but more frequently they are small, and contain no other dwelling than a little hut to shelter the cultivator from heat or storms, or a cottage

for the habitation of an Indian, who has the charge of a contiguous group of gardens. It is said to be a very pleasing sight to watch the arrival of the innumerable rafts, descending at sunrise towards the city by the canals of Chalco and Istacalco, and bearing the rich productions of these floating islands. It is likewise a favourite recreation of the citizens of Mexico to proceed towards evening in small boats, and row in among these luxuriant gardens, where the vegetation is always fresh and brilliant, and where they find an agreeable solace after the fatigues of the day.

Floating gardens of a more fragile kind than those of Mexico are very numerous in the lakes of Cashmere. It may be known to many of our readers that the celebrated land of Cashmere consists of one vast valley, encircled by lofty mountains, and bearing strong evidence of having been, at some distant period, one immense lake. Horizontal lines, running along the face of the mountains on both sides, mark the gradual subsidence of the waters, while the wondrous fertility of the soil warrants the conclusion that at one time an immense quantity of material was furnished by the surrounding elevations. A considerable portion of the city of Cashmere is situated in a part of this valley, where the ground is still marshy, and where, in considerable inundations, it is liable to be flooded. There are also numerous lakes which, with the river Vidusta, separate the city into different insulated portions. Hence many inconveniences arise to the inhabitants, and the cultivation of their gardens is checked by the expectation of a flood, which will render their labour useless, by sweeping away the products of the soil. These circumstances have led to the practice of forming floating gardens, or rather, of taking advantage of those partially formed by nature. In an account of the natural productions of Cashmere Mr. Moorcroft gives an interesting description of these gardens. Various aquatic plants spring from the bottom of the lakes, such as water-lilies, *confervæ*, sedges, reeds, &c., and the boats which traverse these waters, taking in general the shortest way to their places of destination, cut, as it were, a track through the weeds in various directions. In these patches of sedge and rushes the farmer establishes his melon and cucumber floats, by cutting off the roots of the aquatic plants about two feet under water, so that they lose all connexion with the bottom of the lake, but still continue attached to each other. He then presses them together in closer contact and forms them into beds of about two yards in breadth, and of an indefinite length. The heads of the sedge, reeds, and other plants are then cut off, and left on the surface of the float, which is next overlaid with a thin coat of mud, which gradually insinuates itself into the mass of matted stems. The float is prevented from being wafted about by the wind by stakes of willow, which are driven through it at each end, and which do not prevent its rising and falling with the rise and fall of the water. When the gardens are thus prepared for the reception of the vegetable to be raised on it, the gardener has in readiness a number of cucumber and melon plants, which he had previously raised under mats. Such of these as have four leaves, he places upon the floating mass at about two feet distance from each other. After the planting, no further labour is necessary, and the only remaining care is to collect the fruit. Some of these islands will bear a man's weight, but the fruit is generally gathered by a person sitting in a boat; and owing to the small breadth of the garden, all the operations connected with it may be conducted in the same way.

Thus it will be seen that the floating gardens of Cashmere are of an inferior description to those which have excited so much interest in Mexico, and are not capable of producing an equal variety of plants; yet they are sufficient for the wants of the people, and yield in abundance the fruits for which they are prepared. Mr. Moorcroft thus speaks of their luxuriance:—

I traversed a tract of about fifty acres of these floating gardens in cucumbers and melons, and saw not above half a dozen unhealthy plants, nor have I seen in the cucumber and melon grounds, in the vicinity of very populous cities in Europe, or in Asia, so large an expanse of plants in a state equally healthy, though it must be observed, running into somewhat too great luxuriance of growth.

In China, also, where an excessive population renders it imperative on the inhabitants to have recourse to every expedient for increasing their means of subsistence, rafts and floating islands are formed on the surface of their numerous lakes and rivers, the whole of which are teeming with life and vegetation. In the neighbourhood of the city of Canton alone it is calculated that more than forty thousand persons live on the river, in islands, on rafts, or in boats. These persons are considered as a distinct part of the population, being under a separate regulation, and not allowed to intermarry with those on shore. Even the large rafts of timber which are floated down to Canton from the north and west, become the temporary abodes of numbers. Huts are erected on them and families of young children may be seen sporting fearlessly on these plains of floating timber.

Several floating islands have been observed in Lapland. In a small lake near the Gothic fortress of Castello Archione, several have been naturally formed by plants matted and joined together, which have attained sufficient consistence to allow of the peasants getting upon them, and navigating the lake with them, by means of long poles.

A small lake at Artois, near St. Omer, is covered with floating islands, and we are told that the neighbouring farmers draw them near the shore, and drive their cattle on them, to feed upon their rich pasturage, afterwards unloosing the islands again, and allowing them to drift at the mercy of the winds. Some of these islands exist in the Lake Gerden, in Prussia, and are of considerable importance, if the account be correct which informs us that a hundred head of cattle find pasturage on them. An island of this description which exists in the Lake of Kolk, in Osnabruck, is said to be covered with fine elms.

Small floating islands exist in the beautiful Loch Lomond, and in other waters of Scotland and Ireland, nor are the lakes of Cumberland without a specimen of this curiosity. A very remarkable one has emerged from the bottom of the Derwent, three times within the last thirty years. It was formed by the gradual deposition of decayed aquatic plants. In a small sheet of water connected with Esthwaite Lake, Hawkeshead, a floating island, thirty yards long, by five broad, has existed for many years. Some years back a heavy flood lifted it half on land, where it remained stationary, until some young men, taking advantage of a high state of the water, re-launched it, and sailed across the lake upon it. It has frequently been guided from the smaller to the larger lake, and *vice versa*, and on one of its trips it bore fifteen persons across the waters. The shrubs of various sorts growing upon it supply the place of sails.

These islands, generally speaking, may be regarded rather as a matter of curiosity, than of economic importance. They occur in almost every part of the world where a marshy soil is prevalent. In the Nile, in the Congo, in the Lake of Tivoli, in the marshy lakes of Commachio, near the Gulf of Venice, in Guayaquil, in the kingdom of Quito, and many other places, we read of the frequency of floating islands, but we do not find them appropriated to useful purposes except in a few instances. It has been suggested that the water-surface of our own islands might be called upon to contribute to the support of our increasing population, but it is very much to be questioned whether the plan would be attended with beneficial results in such a climate as ours.

Our engraving presents a view of one of these lakes in the Campagna Romana, about fourteen miles from the city

of Rome, of volcanic origin. Its ancient name was *Aqua Albulæ*, since called *Lago Tartari*, *Lago Solfatara*, or, *Lake of the Floating Islands*. The water is of a bright blue colour, highly charged with sulphur; it is much warmer than the atmosphere, extremely disagreeable to the taste, and possesses the property of petrifying all substances with which it comes in contact. Thus, the decomposed rushes and rank weeds with which the lake is bordered, falling therein, become hardened in very large masses, and float on the surface: hence the name, *Lake of the Floating Islands*. Its waters are reported to be fathomless, and no fish can live within its depths. On the side of the lake are the remains of the baths, erected by M. Agrippa, frequented by Augustus, and subsequently repaired by Zenobia, Queen of Palmyra. In consequence thereof, these ruins are now called *Bagni della Regina*, or Baths of the Queen.

It is an imperative duty to maintain at all times an important truth; for even should we despair of seeing it immediately recognised, we may so exercise the minds of others, as to lead them in time to a greater impartiality of judgment, and in the end to a perception of the true light.—SILVIO PELLICO.

MARRIED life appears to me a sort of philosophical discipline, training persons to honourable duties, worthy of the good and wise. Few unmarried people are affected as they ought to be towards the public good, and perceive what are really the most important objects in life.—MELANTHON.

To me there is something affecting in the *last look*, on whatever object it is cast, for the last of everything reminds us of the last of life, the last day we shall spend on earth—the last look we shall fix upon terrestrial scenes—when we must turn from the beloved objects, whose society and sympathy have sweetened our cup of woe, and filled our span of time, to the loneliness of death and the realities of eternity.—SIR THOMAS RAFFLES.

TRUE wisdom bids her disciples search into the mysteries of nature as far as nature's ways are penetrable by man; but, although they scorn to hoodwink reason, they perceive and acknowledge that there is no surer sign of rationality than the forbearing to torture reason with inquiries beyond its scope and ken. True wisdom teaches that, besides the things which are revealed, there yet remain secrets, which belong not to us or to our children: still the knowledge attained and attainable by them is great; and they love not less because they know not more. And how different must be the feelings of one, who sees in all the mechanism and adaptations of the universe but the effects of chance, the results of a blind impulse of mutation, from those with which the self-same wondrous works are beheld by him who traces throughout the whole creation the finger of the great Creator: the former misinterprets the book of nature, and reads therein a melancholy tale, by which he is taught, not in humility, but in despondence, to "say unto corruption, thou art my father, and unto the worm, thou art my sister and my mother;" while to the latter, the heaven and the earth, and all that they contain, become narrators of the wisdom and benevolence of HIM who made them. Yes; for, although there is neither speech nor language, (by reason's ear) voices are heard among them; and the true philosopher, instead of bewildering himself in unsound metaphysical speculations, perceives, even in those things which are the least understood, sufficient evidence of design to forbid their production to be attributed to chance: he recognises at once proofs of skill in the design, that he cannot fathom; and of power in its execution, that he can neither measure nor comprehend. Yet, although incomprehensible, and hence, to some a stumbling-block, and to others foolishness, he beholds in these obscurities many sure manifestations of a wisdom without limit, and of a power without control. Yes, these clouds, which bound the horizon of human knowledge, are clouds of witnesses, for o'er their darkness he sees extended a bow of promise, a standard of the Deity; and therefore, joining in the common theme of praise, with mingled sensations of gratitude and love, he humbly yet confidently declares, "MY FATHER made them all."—GILBERT T. BURNETT.

ON CHESS. XXIV.

CHESS WITHOUT THE BOARD.

THE severe mental exercise necessary for conducting a game of chess, without the help of board or men, was practised at a very early period in the history of the game. So far back as 970 years after Christ, an individual named Joseph Tchelebi is said to have acquired a facility at playing chess, blindfold; nor was this at all an unusual case in the East. The chess-board and men were, however, *handled* by these persons, and the difficulty of conducting the game was thereby greatly lessened.

Far more difficult was the task, and far higher rose the fame of the celebrated personage who appeared in 1266, and astonished the people of Italy by his performances. The name of this man was Buzzecca, a Saracen, who visited Florence at the period above mentioned, and gave play at the same time to three of the best artists in chess which Italy could produce. These games were played in the presence of numerous persons of distinction: two of the games were conducted by Buzzecca without seeing the board, while the third was going on between himself and an antagonist in the ordinary manner. Great was the astonishment and admiration of those who witnessed this trial of skill to find the Saracen winning two games and drawing the third. The opponents of Buzzecca being on this occasion chosen men, and of a country which had become renowned for skilful chess-players, there is the more reason to admire the talent by which he was able to defeat them, and to remark on the high state of cultivation which the science of chess must have arrived at in the East.

Several persons are mentioned as excellent blindfold players, at the close of the sixteenth and commencement of the seventeenth century, especially the celebrated Ruy Lopez, chess-professor at the Spanish court, who wrote an elaborate treatise on chess, but with unusual modesty omitted to mention his own attainments as a blindfold player. Mangiolini of Florence, Zerone, Medrano, Leonardo da Cutri surnamed Il Puttino, and Paolo Boi, are some of the distinguished names of this period in that branch of chess-playing now under consideration. The last-mentioned individual was in the habit of playing three games at once without seeing any one of the boards, and without intermitting his usual strain of lively conversation. He was contemporary with Ruy Lopez, who was decidedly his inferior, and with Leonardo of Cutri, who was by many persons deemed his equal. The life of Paolo is sketched by two historians, Carrera and Salvio, and contains many interesting particulars, which we have given in our notice of celebrated chess-players. Paolo was the conqueror of every chess-player of his day, except Leonardo da Cutri. The contest between Leonardo and Paolo was very severe. They played a match which lasted three whole days. During the first two days they were exactly equal, but on the third Paolo, who was suffering in health at the time, lost ground, and was finally defeated. The two heroes never encountered each other again. Respecting the style of play of these two men we read that Paolo was rapid in his moves, while Leonardo was extremely slow and cautious.

Girolano Saccheri, a priest of the order of Jesuits, is spoken of by Keyser, the historian of Turin, as a man of extraordinary chess attainments. He lived at the early part of the last century, and was of so precocious an intellect, that, before he was ten years old, he could solve the most difficult problems in algebra and arithmetic, and was afterwards constituted public lecturer on mathematics at Pavia. He could play three games, or according to some writers even four, at the same time, with perfect clearness and accuracy, without seeing any one of the boards.

The practice of playing chess blindfold, had, for so

many years fallen into disuse that when the astonishing performances of Philidor were made known, they were regarded as a feat of intellect altogether new and peculiar to that great player. In our biographical sketch of Philidor we have spoken of his achievements in this difficult department of the game, and pass on now to say a few words respecting the most celebrated blindfold players of our own day.

The faculty of playing chess without seeing the board is not the invariable, or even general accompaniment of excellence in that science. Many first-rate players have been unable to attain it, while some who have accepted odds of these, have found little difficulty in carrying out a game to its termination blindfold. Those who study chess chiefly from books, find less difficulty in playing without the board, than those who have acquired their knowledge chiefly from practice. There have been very eminent men who never looked in a chess-book until their own high standing was already taken—of such were La Bourdonnais, Deschappelles, St. Amant, Boncourt,—again there were others who were essentially book-players, and likewise excelled. Mr. Mac Donnel, one of the best players Great Britain has ever produced, studied much from books. In the blindfold games played by him, moves were made more quickly than when he saw the pieces.

He expressed some feeling of annoyance, (says Mr. Walker,) if the bystanders spoke in whispers, but had no objection to conversation being carried on around him in a natural tone of voice.

But since the time of Philidor no one has excelled so highly in the art of blindfold playing as the late M. de la Bourdonnais. With very little practice he was able to play one game at a time, within a pawn of his strength, as he proved by playing publicly with MM. Boncourt, Jouy, Bonfil, and others. He afterwards played two games at once against third-rate players, and was preparing to play three blind-fold games at once against the best players, when an alarming rush of blood to the head was the result of this severe, and we may add useless, mental exertion. A long illness was the consequence, and M. de la Bourdonnais was compelled to relinquish all further attempts at playing without seeing the board.

The difficulties attendant on acquiring skill in chess can scarcely be exaggerated even when playing in the usual manner with unlimited time at command to expend in surveying the forces on the field before us. In how vast a degree must these difficulties be multiplied when the mechanical objects of the chess-men and chess-board are abstracted, and no longer exist save in the powers of the mind; when the windows of the brain are closed down, and the faculties of sight are hermetically sealed; when a bare idea alone remains and all abroad is darkest night; when all that is left of the chess-board and men is their vague and timid shadow, wandering, spectre-like, across the mental chamber, like objects on a camera obscura; when memory and the perceptive faculties of the brain must be taxed, unaided, to name the position of every piece, pawn, and square of the chequer! And when these efforts of the reasoning and thinking powers require to be uninterruptedly prolonged and sustained, during a period of possibly several consecutive hours, without the slightest relief, break, pause, rest, or relaxation; then, I say, the art of playing chess without seeing the board, becomes, fairly considered, an extraordinary effort of the mind; and one which must be allowed to be, in the eyes of the metaphysician, equally curious as interesting.

These remarks by Mr. George Walker apply, of course, to first-rate players who conduct the game blindfold within a pawn of their strength, and in this way play two or even three games at the same time. But to play one game badly without seeing the board is comparatively easy, and may be done by many a second or third rate player who is willing to bestow a little time on the exercise.

Mr. Walker gives some very sensible directions for the guidance of those chess players who are desirous of playing without seeing the board. Referring such as are

interested in the subject to his article in *Fraser's Magazine*, Vol. XXI., p. 302, we pass on to notice the "Art of Playing without seeing the Board," by Carrera, whose remarks are not so well known nor so accessible as Mr. Walker's.

Those who are desirous of learning the art of playing without seeing the board, must have in their mind all the squares of the chess-board, and all the pieces that are or were on them. It is not sufficient, as some think, to know that such a square belongs to such a piece, or has such a number, because much more than this must be learned. In the first place, the player may take as a certain rule, that on the perpendicular lines all the odd numbers are of the same colour; for example, if the first square of a line be white, then the third, fifth and seventh squares will also be white; if the first be black, the third, fifth, and seventh will be black. It is different with the oblique lines, which are either all white or all black; for example, the oblique line which begins at the white king's rook's square is entirely white, and that beginning at the white queen's rook's square, entirely black; and as all the straight lines have neither more nor less than eight squares, it is not necessary to say anything more respecting them; but it is very different with the oblique lines; only two of these contain eight squares, namely, those which begin at the rook's squares, one of which is white, and the other black; those lines which begin at the knight's squares having only seven squares, one line is black, the other white; moreover from the knight's white square on the left hand is another line containing only two squares, and from the king's black square on the right hand, is also a line containing only two squares, but it would be tedious to mention all the squares of the oblique lines; suffice it to say, that all the squares whether black or white, on the right hand or on the left, should be remembered by the student. This is the more required, because it is not only necessary to know the squares from the beginning, but also from the middle and end of the lines: for example, the third square of the white queen is white, which branches into an oblique line of four squares forwards on the king's side, and backwards on the same line two squares on the queen's side; forwards to the left is another line of three squares, and backwards on the king's side two squares; it is also necessary to know which of these squares is the king's fourth, adversary's bishop's fourth, king's third, rook's second, &c.

With regard to the pieces and pawns, it is necessary to have well fixed in the mind their position when on their own squares, in order to know what squares they attack: for example, it is not sufficient to know the situation of the king's pawn at its own square; you must also know that it attacks the queen's third, and king's bishop's third square; the same with the pieces; the white king's knight on its own square attacks the king's second, bishop's and rook's third square: it is much more difficult, when the pieces have quitted their own squares to know what squares they attack, so that the essence of playing without seeing the board consists in the knowledge of the relative position of the squares, and of one's own and one's adversary's pieces, so that the player may not mistake, when he checks the adversary, if he can give him check mate, or if he can interpose any piece or pawn &c., &c.; all which requires, too, a perfect knowledge of the pieces exchanged and taken, for without it one cannot possibly play without seeing the board.

Of the pieces, the knight is considered the most difficult to remember, on account of the peculiarity of its move, and therefore I shall make a few remarks on it; from the square on which the knight is, counting two squares forward, backwards or sideways, the knight attacks the square adjoining the third square to the right and left; the smallest number of squares that the knight can attack is when it is on one of the rooks' squares, as it attacks only two squares; if it be on its own square it attacks three squares; four squares, if it be placed on the bishop's, king's, queen's, knight's second, or rook's third or fourth square; if it be placed on the king's third or fourth, queen's third or fourth, or bishop's third or fourth, it attacks eight squares; if it be placed on the remaining squares it attacks only six squares.

The pawns are more easy to keep in mind, because they never attack more than two squares, and the rook's pawns only one; after the pawns, the piece the easiest to remember is the king, then the rook, then the bishop (because it is easier to remember the perpendicular than the oblique line), then the queen. Besides to play well without seeing the board, it is necessary to play often, which is not a little fatiguing; no one can play so well from memory as if he

saw the board: this is allowed by all who profess to play without seeing the board. I grant that some succeed better than others, but none so well as if they saw the pieces. It is not necessary to be very skilful in order to play without seeing the board, for common players succeed in it; allowing the difference in play between seeing and not seeing the pieces.—*Lewis's Translation of Carrera.*

In the education of the intellectual powers, two chief ends are to be kept in view: first, the most advantageous development of these powers themselves; and, second, the communication of the greatest amount of knowledge capable of being brought into useful application.—*British and Foreign Medical Review.*

It must always be the condition of a great part of mankind to reject and embrace tenets upon the authority of those whom they think wiser than themselves.—*DR. SAMUEL JOHNSON.*

A MAN'S own heart must ever be given to gain that of another.—*GOLDSMITH.*

To adopt popular opinions without the slightest hesitation, is to run the risk of introducing into science, to its great injury, a multitude of confused notions founded on phenomena imperfectly seen and inaccurately examined; but to reject such opinions without examination, is often to lose an opportunity of important discovery.—*Magazine of Popular Science.*

UNION BETWEEN SOUL AND BODY.

WHEN we die, we do not cease to be, nor cease to live, but only cease to live in these earthly bodies; the vital union between the soul and body is dissolved, we are no longer enclastered in a tabernacle of flesh, we no longer feel the impressions of it, neither the pains nor pleasures of the body can affect us: it can charm, it can tempt no longer. This needs no proof, but very well deserves our most serious meditations.

For this teaches us the difference and distinction between soul and body, which men who are sunk into flesh and sense are apt to forget; nay, to lose the very notion and belief of it. All their delights are fleshly; they know no other pleasures but what their five senses furnish them with: they cannot raise their thoughts above this body, nor entertain any noble designs, and therefore they imagine that they are nothing but flesh and blood, a little organized and animated clay; and it is no great wonder that men who feel the workings and motions of no higher principle of life within them, but flesh and sense, should imagine that they are nothing but flesh themselves. Though methinks, when we see the senseless and putrefying remains of a brave man before us, it is hard to conceive that this is all of him; that this is the thing which some few hours ago could reason and discourse; was fit to govern a kingdom, or to instruct mankind; could despise flesh and sense, and govern all his bodily appetites and inclinations, and was adorned with all divine graces and virtues; was the glory and pride of the age. And is this dead carcase, which we now see, the whole of him? Or was there a more divine inhabitant, which animated this earthly machine, which gave life and beauty to it, but which is now removed?

When we consider that we consist of soul and body, which are the two distinct parts of man, this will teach us to take care of both. For can any man who believes he has a soul be concerned only for his body? A compound creature cannot be happy, unless both parts of him enjoy their proper pleasures. He who enjoys only the pleasures of the body is never the happier for having a human and reasonable soul: the soul of a beast would have done as well, and it may be better; for brute creatures relish bodily pleasures as much, and it may be more, than men do; and reason is very troublesome to those men who resolve to live like brutes, for it makes them ashamed and afraid, which in many cases hinders, or at least allays their pleasures. And why should not a man desire the full and entire happiness of a man? Why should he despise any part of himself, and that the best part too? And therefore, at least, we ought to take as much care of our souls as of our bodies. Do we adorn our bodies that we may be fit to be seen, and to converse with men, and may receive those respects which are due to our quality and fortune, and shall we not adorn our souls too with those Christian graces which make us lovely in the sight of God and men?—*DEAN SHERLOCK.*

THE ART OF DECIPHERING THE EFFACED INSCRIPTIONS OF COINS.



It is obvious that we can have no guarantee that specimens of the works of antiquity,—relics of the times gone by,—should pass through the long vale of years, unutilated, and uncontaminated: for such works were neither laid up for the benefit of the moderns, nor were many of them, individually at least, held to be of extraordinary value at the time of their production. To this number may be referred the coins and medals which were struck by races of people long ago extinct, and which now speak so much for their general history, their manners, customs, laws, religion, and arts.

As we cannot therefore hope to handle a coin clean from the Greek or Roman mint, and as we are naturally curious to know from what part of the entire body, a fragment of antiquity may have fallen off, so, when we hold in our hands a piece of money, used perhaps for the commonest purposes of life, by our terrestrial predecessors of 1500 or 2000 years ago, we are eager to find out from it the nation it once belonged to, the prince whose portrait seems to glimmer through the metallic mist, and all the subsidiary information, which it may furnish, and which our general knowledge of the history of that nation concurs to elucidate. When, therefore, the coin has become much or wholly defaced by accident, or the wear and tear of time, it is evident that any means which shall bring again to light that which has been effaced, are desirable to practise, even if the coin should be so eventually injured; for it is plain that an illegible coin or medal is of no use whatever, beyond its mere weight of metal.

It has been for a long time known that the legend, or inscription, on a worn-out coin may be traced and deciphered by putting the coin on a hot iron. It is not known who first made this discovery, nor was an explanation of this fact ever afforded until very lately.

When the coin is laid upon a red-hot iron, an oxidation takes place over its whole surface. The term *oxidation* implies a combination of the metal with the oxygen of the atmosphere; and the oxidized portion therefore, covers the metal like a thin plate, depending for the colour or tint which it assumes upon its thickness. The film of oxide produced by laying the coin upon a hot iron changes its tint with the intensity or continuance of the heat. The parts, however, where the figure or the letters of the inscription had existed, oxidate at a different rate from the surrounding parts; so that these letters exhibit their shapes, and become legible in consequence of the film of oxide which covers them having a different thickness, and therefore reflecting a different tint from that of the adjacent parts*. The tints thus developed sometimes pass through many orders of brilliant colours, particularly pink and green, and settle in a bronze, and sometimes in a black tint, which rests upon the figure and inscription alone. In some cases the tint left on the trace of the letters is so very faint that it can but just be seen, and may be entirely removed by a slight rub of the finger.

The curious results obtained in the manner just described, are thus accounted for by Sir David Brewster. When we take a plane disk of silver, that has never been hammered or compressed, its surface will oxidate equally,

* For the colours of thin plates, as depending upon their thickness, see the papers on the SOAP-BUBBLE, Vol. XV., p. 199, et seq.

if all its parts be equally heated. But, in the process of converting this disk into a coin, the sunk parts are those which were most compressed by the prominent parts of the die; and the elevated parts are those which were least compressed; the metal being in the latter condition left, as it were, more in its natural state. The raised letters and figures on a coin have, therefore, less density than the other parts, and these parts oxidate sooner or at a lower temperature. When the letters of the legend are worn off by friction, the parts immediately below them have also less density than the surrounding metal; and the site, as it were, of the letters therefore, receives from heat a degree of oxidation, and a colour, different from that of the surrounding surface. Hence ensues the revival of the invisible letters by unequal oxidation.

The influence of the difference of density may likewise be observed in the beautiful oxidations which are produced on the surface of highly polished steel, heated in contact with air, at temperatures between 430° and 630°. When the steel has hard portions, called by the workmen, *pins*, the uniform tint of the film of oxide stops near these hard portions, which always exhibit colours different from those of the rest of the mass. These parts, owing to their greater density, absorb oxygen from the air in a less degree than the surrounding portions. The steel, then expanded by heat, absorbs oxygen, which, being united with the metal, forms the coloured film. As the heat increases, a greater quantity of oxygen is absorbed, and the film increases in thickness.

When the experiment is often repeated with the same coin, and the oxidations successively removed after each experiment, the film of oxide continues to diminish, and at last, ceases to appear at all; but it recovers the property in the course of time. When the coin is put upon the hot iron, and when the oxidation is greatest, a smoke arises from the coin, which diminishes, like the film of oxide, by constant repetition. Sir David Brewster has found from many trials that it is always the raised parts of a coin, and in modern coins the elevated ledge round the inscription, that first become oxidated.

There is a very curious experiment connected with this subject, which goes beyond anything hitherto related. This to take a silver coin, (which answers the purpose best), and after polishing the surface as much as possible, to make the raised parts rough by the action of an acid, the sunk parts being left clean, and polished. If the coin thus prepared be placed upon a mass of red-hot iron, and removed into a dark room, the inscription upon it will become more luminous than the rest, so that it may be distinctly read off. The coin should be viewed, during this experiment, through a tube blackened on the inside; by which means the eye will be in a fitter state for observing the effect, and will be somewhat protected from the heat and smoke. If, instead of polishing the depressed parts, and roughening the raised parts of the coin, we polish the raised parts, and roughen the depressed parts, the inscription and figure will be less luminous than the depressed parts; but we shall be able to distinguish them, from their seeming to be traced in black characters on a white ground. The different appearances of a coin, according as the raised parts are polished or roughened, are shown in the figures at the head of this article. In the left hand cut, the raised parts are polished: in the right hand cut they are roughened.

The most surprising form of this experiment is when we use a coin from which the inscription has been either wholly obliterated, or so much obliterated as to be illegible: such are the shillings and sixpences of the last generation: those of England, France, and Spain, serve the purpose of the experiment very nicely. The results with copper coins are more difficult to obtain, and are less palpable: but when we lay a silver coin upon the red-hot iron, the places of the letters and figures become

oxidated, and the film of oxide radiating more powerfully than the rest of the coin will be more luminous than the other parts; so that the inscription, illegible before, may be now distinctly read. The acid is not absolutely necessary to this experiment, when using a thin silver coin.

To understand the reason why inscriptions become legible in the dark, whether the coin is in a perfect state, or the letters of it are worn off, we must remember that all black or rough surfaces radiate light more than polished or smooth surfaces; and hence the inscription is luminous when it is rough, and obscure when it is polished; and the letters covered with black oxide are more luminous than the adjacent parts, on account of the superior radiation of light by the black oxide which covers them.

Sir David Brewster suggests that by means such as these, invisible writing might be conveyed from one place to another, by impressing it upon a metallic surface, and afterwards erasing it by grinding and polishing that surface quite smooth. When exposed to the requisite degree of heat, the secret writing would start forth in oxidated letters.

Some old coins, when being heated, have given out brilliant red globules, accompanied with a smell of sulphur; and sometimes, small globules, like those of quicksilver, have exuded from the surface. Some coins give out an intolerable smell; and an Indian pagoda became perfectly black, when placed upon the heated iron. These results are due to the impurity of the metal and the nature of the alloy.

The cut at the head of this article shows the reverse of a Roman coin of the second century, in which the province of Britain is personified. The figure *BRITANNIA* is found upon many other Roman coins, which were struck for Britain, and has been now used in the English copper coinage for 168 years past. The legend implies that the emperor Commodus, whose bust is on the obverse, was "Pontifex Maximus,"—"in the 10th year of his tribunal authority,"—"in the 7th year of his reign," or A.D. 186,—and, "in the 4th year of his consulship:"—also, that he was "Father of his country."

Bound up amid the thousand ties
Of man's mysterious sympathies,
Is that strange feeling, that hath birth
While, gazing on our parent earth,
The spirit to itself transfers
The sunshine or the gloom of hers.
Who hath not felt the peace that lies
On fields that smile 'neath summer skies
Who to th' eternal hymn of ocean
Responds not with as pure devotion,
Nor drinks a joy of sterner mood
From rugged hill or pathless wood?—HANKINSON.

WHEN Smeaton had reflected long, in search of that form which would be best fitted to resist the combined action of wind and waves, he found it in the trunk of the oak. When Watt was employed to conduct the supply of water across the Clyde to the city of Glasgow, he borrowed his admirable contrivance of a flexible water-main from considering the flexibility of the lobster's tail; and so, when Mr. Brunel was engaged in superintending the construction of the tunnel under the Thames, it was from observing the head of an apparently insignificant insect, that he derived his first conception of the ingenious shield, which he introduced in advance of the workmen, to protect them from being crushed by the falling in of the earth. It becomes us, then, while we trace the operations of human ingenuity in adapting means to its proposed ends, to raise our thoughts to that Divine architect who has imprinted traces of his wisdom and power on all his works: causing the heavens to declare his glory, and the earth, throughout all its domains of land, sea, and air, to show forth his handiwork.—DR. POTTER.

RURAL SPORTS FOR THE MONTHS DECEMBER.

WE have chosen the Ptarmigan as the subject of our present article, not because the pursuit of that bird is esteemed by sportsmen as deserving particular notice,—on the contrary, it is characterised as a tame and uninteresting sport, requiring little enterprise, and gaining little merit,—but that we may draw the attention of our readers to some remarkable circumstances in the natural history of this tenant of the regions of frost and snow.

The ptarmigan belongs to the grouse family, and is sometimes called the "white grouse." Its home is near the tops of elevated mountains, and it seems so averse to the kindly influence of the sun's rays, that as soon as the snow begins to melt on the sides of the hills, it ascends still higher, until it gains the summit, where it forms holes, and burrows in the snow. Most of the Alpine districts of Europe abound in ptarmigans, and even as far north as Greenland they are very numerous. The Greenlanders catch them in nooses dropped over their necks, and account them a great luxury: they eat them, either dressed or raw, and do not object to them in a decaying state; the intestines are reckoned a great delicacy, and are eaten with train-oil and berries. The Greenland women adorn themselves with the tail feathers of the bird, and the men wear shirts made of the skins, with the feathers next the body. The Laplanders take these birds by making a hedge of birch branches with small openings at intervals. In each of these openings is a snare, and the ptarmigans in their search after the young buds and catkins of the trees are easily caught.

The Hudson's Bay ptarmigan, otherwise called the *willow partridge*, is remarkable on account of the immense numbers which are taken. Their flesh is much esteemed by the Europeans of the settlement, and they are said to be as tame as chickens. The usual mode of taking them is by fixing a net twenty feet square, to four poles, and by means of a rope fastened to these props to have the power of pulling down the net at any moment. Persons are employed to drive the birds in the direction of the net, and when a sufficient number are assembled, the concealed manager of the rope lets down the net, and often entraps from fifty to sixty. From November to the end of April it is reckoned that ten thousand of these birds are taken for the use of the settlement. The name of willow partridge has been given to the ptarmigans of that country from their assembling in large flocks at the beginning of October to feed among the willows.

In Britain, this bird is only to be met with on the summits of the highest hills, among the Highlands of Scotland, in the Hebrides and Orkneys, and sometimes on the lofty hills of Cumberland and Wales. We may traverse the heights covered with heather, and still be far below the abode of the ptarmigan. To reach his cliffy and desolate abode you must ascend until, in the language of one of our popular writers,

You begin at last to feel alone, severed entirely from the world of society, of life, and of growth, and committed to the solitude of the ancient hills and immeasurable sky. The snow lies thick on the side of the summit, and even peers over the top, defying the utmost efforts of solstitial heat. There is no plant under your feet, save lichen on the rock, apparently as hard and stony as that to which it adheres—it can hardly be said to grow—and moss in some crevice, undistinguishable from the dull and cold mud into which the storms of many winters have abraded the granite.

And what are the objects which present themselves to notice in this region of snow?

A few mottled pebbles, or at least what appear to be so, each about twice the size of your hand, lie at some distance, where the decomposed rock, and the rudiments of what may be called the most elevated mountain vegetation, just begin to ruffle the surface. By and by, a cloud shadows the sun, the air blows chill as November, and a few drops fall, freezing

or melting in their descent, you cannot tell which. The mottled pebbles begin to move: you throw a stone at them, to show that you can move pebbles as well as the mountain. The stone hits beyond them; they run towards your feet as if claiming protection: they are birds,—ptarmigan,—the uppermost tenants of the island, whom not even winds which could uproot forests, and frosts which could all but congeal mercury, can drive from these their mountain haunts. It has often been observed that of all the human inhabitants of the earth, the mountaineer, be his mountain ever so barren, is the last to quit and the same holds true of the mountain-bird.

The sportsmen who find pleasure in climbing the granite cliffs, and wading the winter snows in which the ptarmigans delight to bury themselves, are few indeed. An excursion of this nature must be regarded as a journey of curiosity, for the purpose of viewing the wilder and more imposing features of our country, rather than as a sporting engagement which is to yield any profitable return. The flesh of the ptarmigan except when taken very early in the season, is much inferior to that of the red-grouse, being less juicy, and deficient in flavour. The chief interest attaching to the bird arises from the peculiarity of its haunts, the simplicity of its habits, and the periodical changes in the colour of its plumage.

The plumage of the ptarmigan has been called "a natural thermometer," on account of its variations in colour with the variations in temperature during the different seasons of the year. The summer plumage is yellow, more or less inclining to brown, and elegantly mottled with black, grey, and white: the quills of the wings, twenty-four in number, have black shafts and white webs. The tail feathers are sixteen in number, seven on each side, and two in the centre, the shafts of which are black. As autumn advances, these colours undergo a gradual change: the black and brown become paler and paler; then the grey fades, until when the winter is fully set in, the whole plumage becomes of a snowy white, except the eye-streak in the male, the outer tail feathers, and the shafts of the middle ones. This change does not take place in consequence of a moult, or falling-off of coloured feathers, to be replaced by white ones; but the change actually takes place in the colour of the feathers themselves, while at the same time the plumage becomes fuller, thicker, and more downy; the bill is almost concealed, and the legs are covered down to the very toes with hair-like feathers.

These changes in colours, have been attributed to a kind provision of nature to enable the birds more effectually to escape their enemies. Now it is certainly true, that the summer vest of the ptarmigan bears some resemblance to the broken tints produced by the brown patches of heath on the mountain slopes, which this bird frequents, and so far screens it from observation: so also does its white livery serve the purpose of concealment when its home is in the snow. But if this be one of the reasons for the change, it is not the principal one. Many of the polar animals, and others which inhabit the colder regions of the temperate zone, undergo a change in colour similar to that of the ptarmigan, and the rapidity of the change has been observed to depend upon the severity of the season. A little attention to the science of heat, will assist us on the present occasion. The temperature of all bodies is greatly influenced by the colour of their surfaces; those which are white reflect most of the heat which falls upon them: those that are black absorb it; so that if a white and a black body be exposed to a high temperature, the latter will be heated much sooner than the former. But on the other hand, a white body parts with its heat slowly,—a black body quickly; hence, if both be placed in a low temperature, the latter will cool much sooner than the former. These facts have long been established with respect to inanimate matter, but they apply with equal force to animals: by the healthy performance of certain functions (chiefly, respiration and the circulation

of the blood), heat is constantly supplied, and thus is maintained a temperature necessary to perpetuate the functions of life: a portion of the animal heat always escapes from the surface of the body by radiation: if the heat escape faster than it is formed, the temperature of the animal body will fall to such a point, that it is no longer sufficient to maintain life;—but, if the body be protected by substances which conduct and radiate heat very slowly, such for example as our winter clothing and the feathers, wool and fur of animals, heat escapes less quickly than it is formed, and the animal is thus enabled to inhabit a spot, the temperature of which is greatly below that of its own body.

Not only is the plumage of the ptarmigan adapted by Providence for the peculiar situation in which the bird is placed, but in respect of its general form the same adaptation is apparent. It stands more firmly on its legs than the other birds of its race, and presents but little resistance to the wind, in consequence of its crouching attitude. Its feet and claws, though feathered down to the very toes, are not impeded or encumbered on this account, for the surface of the mountains is generally dry, and pools of water are speedily converted into ice. The bill is remarkably strong, and is well fitted to crush the hard berries, lichens, &c., on which the bird feeds. It is a habit with the gallinidæ in general to swallow gravel; and the proportion found in the stomach of the ptarmigan is said to exceed that of any other bird. In winter these birds congregate, and live peaceably together; sheltering themselves in holes in the earth, or snow, and even burrowing through the latter until they contrive to reach the scanty vegetation lying beneath its surface. About the month of June they disperse in pairs, and make circular nests a little lower down the mountain. The number of their eggs varies from six to twelve or fifteen; and the young birds are covered with down, of a colour similar to that of their parents' summer plumage. This descent of the ptarmigan to a somewhat lower situation during the breeding season, is probably with a view to find more abundant food for their young, but it subjects them to many dangers, which in their more elevated home they had altogether escaped. The old birds are often obliged to fight desperately in defence of their young, and as soon as possible they lead them away to a place of greater security in the mountain tops. Ptarmigans are the favourite food of the great snowy owl, which is also an inhabitant of the most desolate regions of the North. On perceiving this well known and powerful enemy the affrighted birds dive instantly into the loose snow, and make their way beneath it to a considerable distance. In its favourite mountain summit, the ptarmigan has few enemies, being above the range of the fox, the mountain cat, and the martin, and also out of the usual hunting scenes of the raven and the eagle, so that is not so liable to the attacks of these formidable enemies, as are the red grouse, and other tenants of the heathery regions below. As this bird is thus exempted from some of the dangers common to its kind, so is it apparently deficient in sagacity and resource when attacked. The expression of the head is stupid or simple. Mr. Daniel calls them silly birds, that are tame enough to bear driving like poultry, and suffer a stone to be flung at them without their rising; with all this gentleness of disposition, it is however, difficult to domesticate them. Yet in their own regions they soon become reconciled to the sight of man, and may be caught and destroyed by any device he may choose to employ against them. They are so little anxious to hide themselves that a sportsman meeting with a party may shoot them one by one, till he has destroyed them all, the survivors after each discharge making no attempt to get out of the reach of the shot. They never, on any occasion take long flights or soar aloft in the air, but fly by taking a short circle like pigeons.

Another species of ptarmigan, known as the rock ptarmigan, has lately been brought into this country, but it extremely rare. It is somewhat smaller in size, and may be distinguished from the common ptarmigan, by the black feathers of the back being cut into upon the edges, with patches of yellow only; which, contrasted with the larger size and grey plumage of the other, serves to render it conspicuous.

ENTRANCE INTO THE TROPICS.

As we found our way into the Tropics, we observed that the atmosphere became clearer and clearer; no mists were perceptible, the sun seldom obscured, and the appearance of the sky and stars at night peculiarly bright and clear. The moon, in these latitudes, often assumes an almost vertical position; and many of the stars which belong to the southern hemisphere are visible. Before daylight one morning, the captain called me upon deck to look at the Southern Cross; which is certainly a constellation of rare beauty. One of the five stars which form the cross, however, is of inferior magnitude, and not in the true position; which somewhat mars the image. When I turned towards the east, I enjoyed a still finer spectacle. The horn of an almost expiring moon, Venus, and Mars, were in all their splendour; and the profusion of azure, lilac, ultramarine, pea-green, orange, and crimson, which mantled the sky about half an hour before sunrise, I never before saw equalled.—GURNEY.

To ask the question, "What is knowledge?" is but another way of inquiring, "What is God?" for human learning deserves the name of knowledge only in the proportion in which it is able to display the workings of the All-wise Creator in the visible and unseen universe of which we form a part. There is, indeed, a mass of general information that is useful to the individual in his relations to the society of his home and country; but this is, for the most part, confined to transient customs and opinions, and is for ever being swallowed up in that flood of knowledge which has increased from age to age, spreading its waves with a wider sweep through each succeeding generation, and which will ere long embrace in one common bond of intelligence the great human family upon earth.—*Manuscript Letters.*

THE real philosopher, who knows that all the kinds of truth are intimately connected, and that all the best hopes and encouragements which are granted to our nature must be consistent with truth, will be satisfied and confirmed, rather than surprised and disturbed, to find the natural sciences leading him to the borders of a higher region. To him it will appear natural and reasonable, that, after journeying so long among the beautiful and orderly laws by which the universe is governed, we find ourselves at last approaching to a source of order and law, and intellectual beauty:—that, after venturing into the region of life, and feeling, and will, we are led to believe the fountain of life, and will, not to be itself unintelligent and dead, but to be a living mind, a power which aims as well as acts. To us this doctrine appears like the natural cadence of the tones to which we have so long been listening; and without such a final strain our ears would have been left craving and unsatisfied. We have been lingering long amid the harmonies of law and symmetry, constancy and development; and these notes, though their music was sweet and deep, must too often have sounded to the ear of our moral nature, as vague and unmeaning melodies, floating in the air around us, but conveying no definite thought, moulded into no intelligible announcement. But one passage which we have again and again caught by snatches, though sometimes interrupted and lost, at last swells in our ears full, clear, and decided; and the religious "Hymn in honour of the Creator," to which Galen so gladly lent his voice, and in which the best physiologists of succeeding times have ever joined, is filled into a richer and deeper harmony by the greatest philosophers of these later days, and will roll on hereafter, the "perpetual song" of the temple of science.—*History of the Inductive Sciences, by the REV. WILLIAM WHEWELL.*

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